

PHYSICS FOR THE LECTURE ROOM AND
LABORATORY.

- (1) *The Elements of Electricity and Magnetism. A Text-book for Colleges and Technical Schools.* By Prof. W. S. Franklin and Barry Macnutt. Pp. viii+351. (New York: The Macmillan Co.; London: Macmillan and Co., Ltd., 1908.) Price 7s. net.
- (2) *A Short University Course in Electricity, Sound and Light.* By Dr. Robert A. Millikan and J. Mills. Pp. v+389. (Boston and London: Ginn and Co., n.d.) Price 8s. 6d.
- (3) *Naturlehre für höhere Lehranstalten auf Schulerübungen gegründet.* By Dr. Friedrich Danneman. Teil ii. Physik. Pp. vii+204. (Hanover and Leipzig: Hahnsche Buchhandlung, 1908.) Price 3.50 marks.
- (4) *The Elementary Theory of Direct Current Dynamo Electric Machinery.* By C. E. Ashford and E. W. E. Kempson. Pp. vii+120. (Cambridge: University Press, 1908.) Price 3s. net.
- (5) *Electrical Laboratory Course for Junior Students.* By R. D. Archibald and R. Rankin. Pp. vi+95. (London: Blackie and Son, Ltd., 1908.) Price 1s. 6d. net.

(1) THE order in which the elements of electricity and magnetism are presented in the first volume under notice is:—(a) Electric current; (b) magnetism; (c) electrostatics; (d) electric waves. This order is one which does not make the exposition perfectly happy. Thus it does not seem natural when it is found necessary to refer provisionally to the measurement of currents by their magnetic effect (p. 7) prior to any statement as to how magnetic effects themselves are measured. Surely the natural order is to take magnetism before considering the electric current, even though it may be preferred to deal with both before considering the phenomena of electrostatics. The author passes naturally and easily to the exposition of the last-named phenomena, and as many prefer this order this portion may certainly be commended to them.

The author is convinced that "elementary science instruction must be made to touch upon the things of everyday life if it is to be effective." This sentence may be taken as the keynote to the entire book. Thus electric resistances are usually represented as electric lamps. Those who are accustomed to abstract thinking may smile at these concrete representations; but it must be remembered that this is only an elementary book, and it must be admitted that much of the difficulty which many junior students feel is connected with the unreality of the subject as it appears to them. We commend the book for endeavouring, in this and other ways, to make the subject more real than it usually is.

More attention is given than is customary in an elementary course to phenomena connected with recent discoveries, such as cathode rays, radio-activity, electric waves, &c. We conclude that in America a junior course is in some respects more advanced than with us. This remark applies most to the chapter on elec-

tric waves, and to the appendix on ship's magnetism. Both these portions are very well done, though we would have thought them fairly strong meat for those who are making a "first systematic study of the subject." However, whether a student takes them in completely in his first study or not, he will be very glad to find them here ready to hand when required.

(2) The second of the volumes under review "represents primarily an attempt to secure a satisfactory articulation of the laboratory and class-room phases of instruction in physics." Expressed otherwise, it consists of a description of laboratory work, each experiment being preceded by as much theory as is necessary to make a complete logical exposition of the subject under study. We think that this plan is an excellent one; and it has been very satisfactorily carried out. Of course, it will be understood that the theoretical part is not sufficient to replace a text-book dealing specially with the theory.

Although electrostatics is introduced in the first chapter, electric capacity is not defined until later, when it can be measured by means of a ballistic galvanometer. There may be something to be said for this, but we think that the course of experiments would be considerably improved and the student would get a more vivid idea of what capacity is if experiments were added on parallel plate condensers used along with a gold-leaf electroscope or an electrostatic voltmeter.

In sound, a series of experiments on diffraction is included. The experiments on light *begin* with diffraction, a fact which prepares us for the exclusive use of the wave-method in proving the general phenomena of reflection and refraction. The final chapter is on radio-activity, and contains some simple experiments on uranium and thorium salts. The book is altogether a most excellent manual.

(3) We find in our third volume a well-selected series of very elementary experiments in the whole round of physics suitable particularly for school use. Though the subject is dealt with satisfactorily as a rule, it is not beyond criticism. The diagram of the paths of rays in a microscope would be improved if the rays represented as passing through the eyepiece were the same as those transmitted through the objective. The experiment on the "velocity of electricity" would be best left out of such an elementary book; the statement that electricity travels with the velocity of light is, of course, absurd.

(4) We are in entire agreement with the authors of this book, that in the training of an electrical engineer there should be included a knowledge of the theory of the subject built up logically from first principles, each step being illustrated with the help of some piece of machinery or practical appliance of a general and simple rather than an elaborate or necessarily up-to-date type. The present volume is intended to be used only as a note-book accompanying a course of experimental lectures. The authors are to be congratulated on the excellence of their little manual. The diagrams in particular are very carefully designed.

(5) The last of this group of text-books covers an elementary first year's evening course and part of a

second year's course. The first method of proving the inverse square law for magnetic poles will not convince. However, putting aside an occasional criticism of this kind, we think that the book will well serve its purpose of replacing manuscript instruction sheets in a junior laboratory.

OUR BOOK SHELF.

Théorie des Corps déformables. By E. et F. Cosserat. Pp. vi+226. (Paris: A. Hermann et Fils, 1909.) Price 6 francs.

THE authors, who are well known by their writings on general elastic theory, here reprint in separate form an appendix contributed by them to M. Chwolson's "Traité de Physique." The kinematical and dynamical theories of the flexible line, the flexible surface, and the deformable three-dimensional medium are discussed in turn in great detail. The dynamical standpoint adopted is that of the principle of action, which forms, in the authors' opinion, the only satisfactory basis for the "deductive" exposition of the subject. In each case the most general form of the function representing the "action" is sought which is consistent with the necessary invariante relations. This procedure is, of course, not altogether new, and an expert, turning over the pages, will recognise much that in one form or another is familiar to him. The treatment is necessarily somewhat abstract, and is mathematically very elaborate, Cartesian methods being followed throughout. To many readers the long train of general investigations, unrelieved by a single application, may prove deterrent; but the authors at all events claim that their procedure has never before been carried out so resolutely and completely, and may justly pride themselves on the mathematical elegance of their work. Apart from its other qualities, the treatise has a distinct value as a book of reference, and furnishes a whole arsenal of formulæ which may save trouble to future writers.

The book begins with a kind of philosophical introduction to which the authors attach great importance. This requires to be read in conjunction with a previous treatise, which has also appeared in the French edition of M. Chwolson's work. Those who adopt in its fullest extent the empirical view of mechanics will perhaps consider that too much weight is attached to discussions of this kind. The historical references are, however, interesting, and fairly complete. The authors are indeed exceptionally well read in the history of their subject, and admirably conscientious in their citation of authorities. In their preface they promise a subsequent treatment of the theories of heat and electricity from a similar standpoint.

Practical Physiological Chemistry. A Book designed for Use in Courses in Practical Physiological Chemistry in Schools of Medicine and of Science. By Prof. Philip B. Hawk. Second edition, revised and enlarged. Pp. xvi+447. (London J. and A. Churchill, 1909.) Price 16s. net.

PROF. HAWK'S text-book falls into the front rank with the numerous additions and improvements which have been introduced into the new edition. It is not only a practical guide, and, as such, should be found in all physiological laboratories, but forms a very complete, readable, and up-to-date account of our present knowledge of the chemical side of physiology.

A special feature has been made of the illustrations, which are beautifully executed, and most of which will be new to workers in physiological chemistry. The crystalline forms of the many protein derivatives which the work of Emil Fischer and his colleagues

has been instrumental in rendering familiar to the students of this branch of science will be found among them.

One small slip we notice in connection with the matter of protein nomenclature. The initiation of the new system of terminology which is now being adopted for the albuminous substances is wrongly attributed to the British Medical Association. It was really a committee of the Physiological and Chemical Societies of this country which set the ball rolling.

The mistake is, however, a pardonable one, seeing that it was at the meeting of the British Medical Association held at Toronto in 1906 that the opportunity of presenting the subject to our American colleagues was taken advantage of. The success that has attended this effort to secure uniformity of nomenclature amongst English-speaking people has been very gratifying; the American system, adopted under the auspices of the American Physiological Society and the American Society of Biological Chemists, differs in only small and unimportant details from our own.

W. D. H.

Behind the Veil in Bird-land. Some Nature Secrets revealed by Pen and Camera. By Oliver G. Pike, with a number of pen sketches by E. R. Paton. Pp. 106. (London: The Religious Tract Society, 1908.) Price 10s. 6d. net.

SINCE the Keartons, some years ago, showed what splendid results could be achieved by an intelligent use of the camera as an aid to the study of natural history, a host of nature-photographers has arisen, but only a very few have attained the high standard of merit set by the founders of this branch of photography. Mr. R. B. Lodge and Miss E. L. Turner in this country, Schillings in Germany, and H. K. Job in America have in some respects even surpassed the Keartons; while in this display of resource and dogged persistence in the most trying circumstances they stand unrivalled.

Mr. Pike in this rather pretentious volume has given some very excellent photographs, but the "Nature Secrets revealed by Pen and Camera" which he promises in his title-page are conspicuous by their absence. His pages contain hardly one single new fact, but a great deal that is banal. He solemnly assures us, in writing of the kestrel, that "The first summer rose, a delicate pink amidst the surrounding green, is a greater picture of spring than ever the sunlit sea could be"—which statement contains a great deal of truth!—"and," he continues, "a kestrel hovering over a meadow, yellow with summer's flowers, tells us a deeper story than the eagle soaring over a wind-swept moor." We fail to grasp why this should be so.

"Bird-land's veil" is constantly being "lifted up" for him, like the drop-scene at the theatre, and on the stage appear blackbirds, which tell him "the story of the leaves and flowers," and wrens, which reveal "the secrets of the hedgerows," while skylarks, to complete the illusion, like the celebrated Grigolati troupe in the pantomime, fly to and fro across the stage, and sing "happy songs"! Perfectly charming!

W. P. P.

An Account of the Deep-sea Asteroidea collected by the R.I.M.S.S. "Investigator." By Prof. René Koehler. Pp. 143; 13 plates. (Calcutta: Indian Museum, 1909.) Price 12 rupees.

THIS substantial contribution to the material of the echinoderm "system" consists of 126 pages of minute description, and nine pages of general remarks. It is a continuation of certain reports of a preliminary and incentive character published many years ago by the naturalists and pioneers of the Indian Marine Survey, but, except that some doubtful identifications